

REMARKS

This responds to the Office Action mailed on October 20, 2006.

Claims 1, 10, 17 and 29 are amended; as a result, claims 1-4, 10-17, and 29 are now pending in this application.

Claim Objection

Claim 1 was objected to due to informalities. It is believed that the amendment made herein to claim 1 obviates the objection.

Supplemental Information Disclosure Statement

The Examiner had previously indicated that the Supplemental Information Disclosure Statement filed on July 24, 2003 was not in the U.S. Patent Office file and therefore was not considered.

Accordingly, Applicants previously submitted a copy of the Supplemental Information Disclosure Statement, Form 1449, and copies of the four non-U.S. patent documents listed on the Form 1449 with the Response Under 37 CFR 1.116 filed on January 5, 2006.

Applicant respectfully requests that a copy of the 1449 Form, listing all references that were submitted with the Supplemental Information Disclosure Statement filed on July 24, 2003, marked as being considered and initialed by the Examiner, be returned with the next official communication.

§103 Rejection of the Claims

Claim 1 was rejected under 35 USC § 103(a) as being unpatentable over Chen et al. (U.S. 6,160,311) in view of Jimarez et al. (U.S. 6,407,334). The Applicant respectfully traverses the rejection and requests the Office to consider the following.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (M.P.E.P. § 2143 8th Ed. Rev. 1).

Claim 1 as amended reveals a planar heat sink. Further, Chen et al. teach a guarding wall 321, which although it is removed during cutting (from FIG. 5 A to FIG. 5 B), fails to have the structure of a planar heat sink and more than one microelectronic die.

A previous Office Action admitted that “Chen et al. fail to disclose the patterned adhesive layer 33 is a patterned thermally conductive adhesive.” But this admission must also be applied to Jimarez, as Jimarez also has only a single adhesive 44, which by review of single adhesive 44 in Fig. 8 of Jimarez, cannot be patterned. Jimarez also fails to teach an encapsulation material on said die active surface and on said heat sink.

Regarding the first criterion, there is no teaching or suggestion in either Chen or Jimarez to combine reference teachings. Chen relates to packaging a wire-bond chip 31 to a substrate 34, which acts as an interposer of sorts, to make electrical contact with a metal ball 37. Jimarez relates to assuring electrical grounding within a package by coupling a chip 34 to a large body of electrically conductive adhesive 40. There is no teaching or suggestion in Chen to look to Jimarez to find an adhesive 44 in Jimarez. Jimarez also fails to teach an encapsulation material that is disposed both on the die active surface and the heat sink, as required in claim 1. The structure of Jimarez is significantly different from what is claimed, and its incidental occurrence of an adhesive 44 is neither taught or suggested in Chen. Withdrawal of the rejection is respectfully requested.

Regarding the second criterion, there is no expectation of success to achieve the enhanced heat dissipating of Chen, or the electrical grounding of Jimarez by their combination. This is because of their disparate endeavors in the technologies they teach. That Jimarez also does not have a patterned adhesive, Jimarez can only be combined with the teachings of Chen by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Regarding the third criterion, because all the claims limitations are not taught in the cited references, a *prima facie* case of obviousness has not been established. Further, merely that the

Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art" Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. Applicant respectfully asserts that the combination of Chen with Jimarez cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claim 29 was also rejected under 35 USC § 103(a) as being unpatentable over Chen et al. in view of Jimarez et al. and further in view of Woodward et al. (U.S. 4,731,700). The Applicant respectfully traverses the rejection and requests the Office to consider the following.

Applicant incorporates all the arguments above regarding the improper combination of Chen with Jimarez. Further, neither Chen nor Jimarez, alone or in combination, teach all the limitations of the independent claims as amended. The Office Action admits that "Chen et al. fails to disclose a microelectronic package core and wherein at least one die is disposed within at least one package core opening." (Office Action at page 3). Woodward provides a radically different technology than either of Chen or Jimarez.

Applicant notes that structurally between Woodward's chip 16 and his heat sink 12 is a layer of molybdenum 12c that is not taught as an adhesive of any type. Rather, item 12c is simply referred to as a part of the heat sink 12. Woodward has the same failing as Chen et al. and Jimarez, that the layer 12c is not patterned. Further, Woodward is devoid of any teaching of an encapsulant that should increase indication of the impropriety of combination.

Regarding the first criterion, because Woodward is solving wire routing problems by disposing some wiring 24 across the chip 16, and because Chen and Jimarez have significantly different technical challenges from each other and from Woodward, the combination of Chen and Jimarez with Woodward can only be reached by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Regarding the second criterion, there is no expectation of success to get a better pin-out for Chen by the application of Woodward, and there is no expectation of success to better ground

the die in Woodward by the application of Jimarez. Withdrawal of the rejection is respectfully requested.

Regarding the third criterion, merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art" Applicant respectfully asserts that the combination of Chen and Jimarez with Woodward, creates a teaching that starts to drop out claimed elements, including a patterned thermally conductive adhesive. Applicant therefore respectfully asserts this combination cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claims 1-4 were also rejected under 35 USC § 103(a) as being unpatentable over Eichelberger (U.S. 5,250,843) in view of Jimarez et al. Applicant respectfully traverses the rejection and requests the Office to consider the following.

The cited references, whether alone or in combination, do not teach all the limitations of the independent claims as amended. The Final Action admits "Eichelberger does not disclose a thin die attach material 16 is a patterned thermally conductive adhesive layer." (Office Action at page 4). Applicant notes Eichelberger's thin die attach material 16 is not patterned as required by claim 1. Applicant further notes Eichelberger's encapsulant 18 is not disposed on the substrate 12, rather, it is disposed on the die attach material 16. Therefore, Eichelberger's structure is not, nor cannot be construed to teach or suggest what is claimed. The Office Action looks to Jimarez to remedy what is missing in Eichelberger. But Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1.

Regarding claim 1 and the first criterion, there is no teaching or suggestion in either Eichelberger or Jimarez to combine reference teachings to achieve the limits of claim 1. Eichelberger fails to teach patterned adhesive layer and an encapsulant that is disposed on both the heat sink and the die active surface. Jimarez relates to assuring electrical grounding within a package by coupling a chip 34 to a large body of electrically conductive adhesive 40. There is not teaching or suggestion in Eichelberger to look to Jimarez to find a patterned adhesive 44 in Jimarez. Withdrawal of the rejection is respectfully requested.

Regarding claim 1 and the second criterion, there is no expectation of success to achieve the structure of Eichelberger, or the electrical grounding of Jimarez by their combination. This is because of their disparate endeavors in the technologies they teach. That Jimarez may have a patterned adhesive 44 can only be combined with the teachings of Eichelberger by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Regarding claim 1 and the third criterion, merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art" Applicant respectfully asserts that the combination of Eichelberger with Jimarez cannot be made without using the Applicant's disclosure as a guide, and even if they could be combined properly, they do not teach all the claim elements as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 2, although Eichelberger may teach a build-up layer etc., because claim 2 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 3, although Eichelberger may teach a conductive trace etc., because claim 3 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Regarding claim 4, although Eichelberger may teach a second conductive trace etc., because claim 4 depends from claim 1, all the claim limitations are not taught as set forth above. Withdrawal of the rejection is respectfully requested.

Claim 29 was also rejected under 35 USC § 103(a) as being unpatentable over Eichelberger in view of Jimarez et al., and further in view of Woodward et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The cited references, whether alone or in combination, do not teach all the limitations of the independent claim 29 as amended. The Office Action admits Eichelberger fails to disclose "a microelectronic package core and wherein at least one die is disposed within at least one package

core opening.” (Office Action at page 6). Applicant notes Eichelberger's thin die attach material 16 is not patterned. Applicant further notes Eichelberger's encapsulant 18 is not disposed on the substrate 12, rather, it is disposed on the die attach material 16. But Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. This deficiency is made clear in the figures of Jimarez, where the die, e.g. die 36 is first underfilled 38, then encapsulated 42, such that the encapsulation material is decidedly not disposed on the die active surface and the heat sink, as required in the claims. Jimarez also fails to teach a patterned layer as required in claim 1.

Applicant notes that structurally between Woodward's chip 16 and his heat sink 12 is a layer of molybdenum 12c that is not taught as an adhesive of any type. Rather, item 12c is simply referred to as a part of the heat sink 12.

Regarding the first criterion, because Woodward is solving wire routing problems by disposing some wiring 24 across the chip 16, and because Eichelberger and Jimarez have significantly different technical challenges from each other and from Woodward, the combination of Eichelberger and Jimarez with Woodward can only be reached by using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Regarding the second criterion, there is no expectation of success to get a better pin-out for Eichelberger by the application of Woodward, and there is no expectation of success to better ground the die in Woodward by the application of Jimarez. Withdrawal of the rejection is respectfully requested.

Regarding the third criterion, merely that the Office Action assembles a mosaic of elements to assert a rejection, does not mean all the claims limitations are taught within the standard of unobviousness. The standard of patentability requires "the subject matter as a whole" was not "obvious at the time the invention was made to a person of ordinary skill in the art" Applicant respectfully asserts that the combination of Eichelberger and Jimarez with Woodward, creates a teaching that starts to drop out claimed elements, including a patterned thermally conductive adhesive. Applicant therefore respectfully asserts this combination cannot be made without using the Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Claims 10, 15 and 16 were also rejected under 35 USC § 103(a) as being unpatentable over Shen (U.S. 6,368,894) in view of Woodward et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The cited references, whether alone or in combination, do not teach all the limitations of the independent claim 10 as amended. Regarding the combination of Shen and Woodward, Shen and Woodward cannot be combined because there is no location for Woodward's structure 14 between Shen's semiconductor chip 2 and second semiconductor chip 3. Therefore, the application of Woodward to Shen, destroys and renders impossible the structures taught by Shen. Any modification of Woodward's structure to be accommodated by Shen can only come by using the Applicants' disclosure as a guide because it is not found in the prior art. Withdrawal of the rejection is respectfully requested.

Regarding claim 15, the Office Action states "Woodward et al. disclose a thickness of the ceramic member 14 is greater than a thickness of at lest one die 16." (Office Action at page 7). This statement reinforces Applicant's assertion that the combination of Woodward with Shen destroys the teaching of Shen. First, using Woodward's ceramic 14 with a thickness greater than the chip 16 amounts to increasing the vertical profile of Shen. This defeats the low-profile geometry of Shen. Second, Woodward's ceramic 14 is disposed upon a heat sink 12, and there is no equivalent location to place any such structure upon a heat sink in Shen. Because the motivation for such a teaching or modification comes from Applicants' disclosure, and not from the cited references, withdrawal of the rejection is respectfully requested.

Regarding claim 16, the Office Action asserts Shen discloses the package core is a material selected from the group consisting of ceramics or metals (Office Action at page 7). As set forth above, the importation of Woodward into Shen, destroys and renders impossible the structures taught by Shen. Because the combination of Woodward with Shen does not amount to the limitations of claim 16, withdrawal of the rejection is respectfully requested.

Claims 11-14 were also rejected under 35 USC § 103(a) as being unpatentable over Shen in view of Woodward et al. and further in view of Eichelberger. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The cited references, whether alone or in combination, do not teach all the limitations of the independent claim 10 as amended, from which claims 11-14 depend. The Office Action admits Shen and fails to disclose “a build up layer disposed on an upper surface of the encapsulation material.” (Office Action at page 8). Applicant incorporates all the arguments regarding the impropriety of combining Shen with Woodward. Applicant further notes that the combination of Shen with Eichelberger creates the same dilemma as the combination of Shen with Woodward.

Regarding the combination of Shen and Eichelberger, Shen and Eichelberger cannot be combined because there is no location for Eichelberger’s structures 18, 20, 24, and 26 between Shen’s semiconductor chip 2 and second semiconductor chip 3. Therefore, the application of Eichelberger to Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Any modification of Eichelberger’s structure to be accommodated by Shen can only come by using the Applicants’ disclosure as a guide because it is not found in the prior art. Withdrawal of the rejection is respectfully requested.

Regarding claim 11, although the Office Action asserts Eichelberger discloses the build up layer as set forth above, the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 11, withdrawal of the rejection is respectfully requested.

Regarding claim 12, the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 12, withdrawal of the rejection is respectfully requested.

Regarding claim 13, although the Office Action asserts Eichelberger further includes “at least one dielectric layer 24” (Office Action at page 9), as set forth above the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 13, withdrawal of the rejection is respectfully requested.

Regarding claim 14, although the Office Action asserts Shen discloses the encapsulation (34 and 24) covers the package core first surface, as set forth above the importation of Eichelberger into Shen, destroys and renders impossible the structures taught by Shen, and as set forth above, Woodward also destroys the structure of Shen. Because the combination of Eichelberger with Shen and Woodward does not amount to the limitations of claim 14, withdrawal of the rejection is respectfully requested.

Claim 17 was also rejected under 35 USC § 103(a) as being unpatentable over Shen in view of Woodward et al. and further in view of Jimarez et al. The Applicant respectfully traverses the rejection and requests the Office to consider the following.

The cited references, whether alone or in combination, do not teach all the limitations of the independent claim 10 as amended, from which claim 17 depends. The Office Action admits Shen fails to disclose a “thermally conductive adhesive layer disposed between the microelectronic die and the heat sink.” (Office Action at page 0). Applicant respectfully asserts the combination of Shen with Woodward cannot be made. The board 10 and solder ball connector 48 in Jimarez, destroys the structure of Shen. The board 10 and solder ball connector 48 in Jimarez are for mounting against a printed wiring board (Jimarez at column 3. lines 34-39), not another chip as in Shen.

Applicant incorporates all the arguments regarding the impropriety of combining Jimarez with Woodward as set forth above, and therefore respectfully requests withdrawal of the rejection. Jimarez also fails to teach an encapsulation material that is disposed on the die active surface and the heat sink, as required in claim 1. This deficiency is made clear in the figures of Jimarez, where the die, e.g. die 36 is first underfilled 38, then encapsulated 42, such that the encapsulation material is decidedly not disposed on the die active surface and the heat sink, as required in the claims.

Regarding the combination of Jimarez with Shen, Applicant notes that there is no teaching or suggestion in Shen to include a patterned adhesive, or any adhesive for that matter, between Shen's metal heat dissipating plates 23 and 33, and their respective chips 2 and 3. The

combination of Shen with Jimarez can only be achieved by using Applicant's disclosure as a guide. Withdrawal of the rejection is respectfully requested.

Conclusion

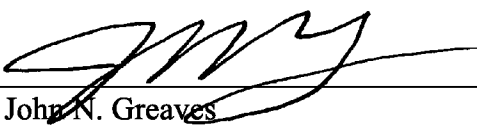
Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney at (801) 278-9171 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

XIAO-CHUN MU ET AL.

By their Representatives,
SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, Minnesota 55402
(801) 278-9171

By /  /
John N. Greaves
Reg. No. 40,362